NASAFacts

National Aeronautics and
Space Administration

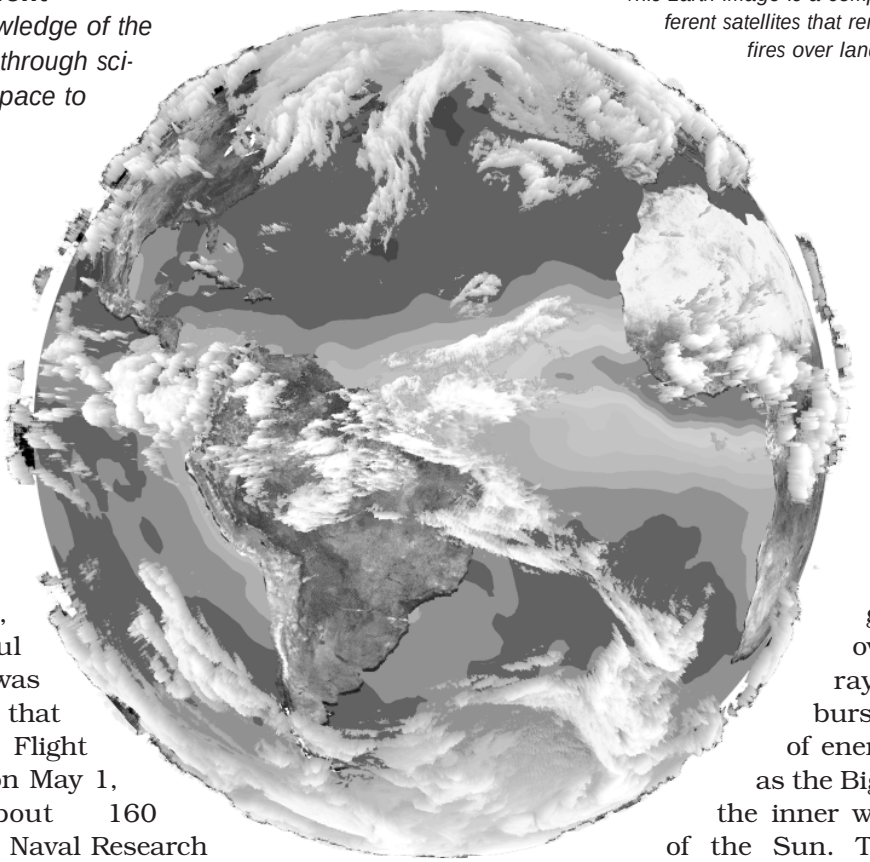
Goddard Space Flight Center
Greenbelt, Maryland 20771
AC 301 286-8955

FS-1999 (04)-007-GSFC

Goddard Space Flight Center

GSFC Vision Statement

"We revolutionize knowledge of the Earth and the universe through scientific discovery from space to enhance life on Earth"



This Earth image is a compilation of data from several different satellites that remotely sense vegetation, clouds, fires over land, and aerosols over the ocean. Image by R.B. Husar.

NASA was born out of the race to be the foremost spacefaring nation in the world. The Soviets snatched leadership in space with the 1957 launch of Sputnik, the first successful satellite in orbit. It was in that atmosphere that the Goddard Space Flight Center was formed on May 1, 1959. With about 160 researchers from the Naval Research Lab (project Vanguard) the Goddard Space Flight Center began. A tract of land was identified near the Beltsville Agricultural Research Center and its ownership was negotiated between the Federal Government and the State of Maryland.

Those 160 researchers grew into today's nearly 12,000-combined civil servant and contractor workforce. From that modest beginning, scientists, engineers, technicians and administrative staff members now occupy more than dozens of buildings across 1270 acres at the Greenbelt campus alone. Goddard's Wallops Flight Facility occupies over 6100 acres and another 84 major buildings including aircraft hangars.

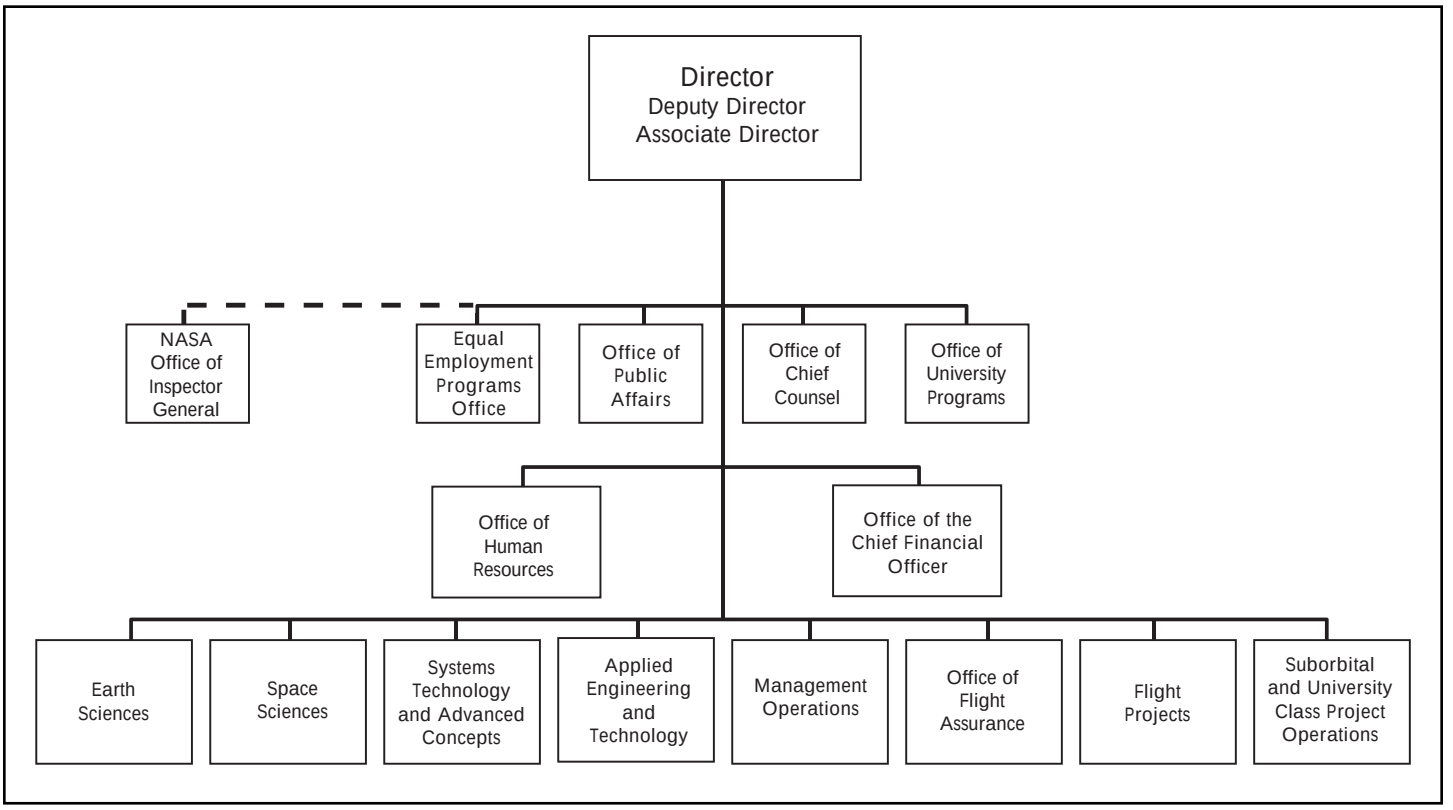
The '60's were, for Goddard, a time to test new schemes, to see how, and if, spacecraft could withstand the environment of space. Goddard built satellites, and the rockets to launch them. Goddard created ways to control and track the spacecraft, and to collect and send data back and forth, and analyze the data.

Today, the variety and scope of Goddard's Space and Earth science missions is mind-boggling. Scientists puzzle over mysterious gamma rays and gamma ray bursts, sudden explosions of energy almost as powerful as the Big Bang itself, and study the inner workings and dynamics of the Sun. They catch images of plumes or solar flares and watch for massive ejections of electrically charged particles that smack into the Earth's outer atmosphere potentially interrupting satellite communications and causing spectacular auroras. They take fingerprints of the chemical composition of galactic clouds to tell us how stars are formed, or seek to learn how starburst galaxies in far remote regions evolve.

Meanwhile, Earth scientists acquire data about the global rainfall, and ocean color, and look at sea surface temperatures and how they relate to the formation of El Niño and La Niña. And as Goddard prepares to celebrate 40 years of past accomplishments, NASA is on the threshold of an era of unprecedented study of the Earth.

Goddard has come a long way from hearing simple single audio tones from passing satellites.

In 1999, Goddard's 40th year, the Center celebrates



the past, but at the same time marches confidently toward the new millennium with a new commitment to safety, quality and mission success.

Safety is the Center's No. 1 priority, including the safety of individual employees, mission safety and the safety of high value hardware.

Another priority for Goddard in 1999 is ISO 9001 certification, which will demonstrate to Goddard's customers an unwavering commitment to quality products that produce reliable results at an affordable cost.

A third theme for Goddard is meeting commitments and keeping promises. The Center is committed to the safe, on-time launch of Goddard missions, spacecraft and instruments planned in 1999, preparing for full-cost accounting and ensuring all mission critical systems are Year 2000 compliant. And beyond this year, Goddard will work toward continued progress on missions planned for 2000 and beyond such as EOS PM, EOS Chem, ICESat and Triana in Earth science, and the Next Generation Space Telescope and Microwave Anisotropy Probe in space science.

Another theme for Goddard in 1999 is to continue providing scientific and technological leadership in Earth science, including work on the next generation EOS architecture and the Digital Earth effort, and in the space science areas of Sun Earth Connection, Structure and Evolution of the Universe and the Next-Next Generation Astrophysics Observatories.

Finally, Goddard has rededicated itself to a creating a workplace environment that values diversity, provides opportunities for each and every employee to grow, improve and advance, and offers training opportunities to learn new skills or hone current skills. Goddard will continue to seek opportunities for meaningful work, including sufficient in-house work to assure the maintenance of core competencies, a sustainable workload with timely revitalization of and a strategic investment in the workforce, and value-centered work practices with a special emphasis on "balance" and "respect". The Center's core values include: agility, balance creativity, dedication, integrity, respect and teamwork.

Goddard at 40: Proud of the Past, Prepared for the Future

History

The Goddard Space Flight Center, named for Dr. Robert H. Goddard, a pioneer in rocket research, was established in 1959. Since that time, GSFC has played a major role in space and Earth science.

The Goddard team is made up of some of the world's premier scientists and engineers devoted to research in Earth science, space science and technology. Goddard's fundamental mission is to expand knowledge of the Earth and its environment, the solar system and the universe through observations from space. The Center is committed to excellence in scientific research and investigation, in the development of space systems and in the advancement of essential technologies. This commitment is exemplified in every flight project, scientific campaign, workshop or Center activity in support of our mission.

Organization

The Center is comprised of a system of directorates:

Office of the Director – The Office of the Director provides overall management and coordinates control over the diversified activities of the Center.

Office of Human Resources - The Office of Human Resources provides services to the Goddard Space Flight Center in a broad range of human resources management and workforce development functional areas and services to NASA Headquarters in training and development. These services assist those organizations to optimize their most valuable resource--employees. The Office works with all levels of Center and Headquarters management, Center and Headquarters employees, and the public to create and sustain a diverse, vital and effective workforce and a supportive work environment that enables successful achievement of NASA's mission and vision.

Office of the Chief Financial Officer - The Office of the Chief Financial Officer provides planning and direction for development, implementation, overview and administration of resource management and financial control in support of the Center and the Agency.

Management Operations - The Management Operations Directorate mission is to create, operate and manage mission communications, business systems and core infrastructure to support the strategic goals of the Center and the Agency.

Office of Flight Assurance – The Office of Flight Assurance is responsible for safety, reliability and quality assurance programs to ensure flight mission success. The directorate is responsible for independent design reviews of technical and flight safety aspects of spacecraft and instruments as well as for supporting systems safety and mission assurance over the entire program life cycle for all GSFC space flight and space flight support missions.

Flight Projects – The Flight Projects Office is responsible for the overall management of GSFC flight programs and projects including contracts management, technical and business management, mission design, fabrication, integration, test, qualification, readiness review management, launch operation and orbital operations. This includes responsibility for a wide range of missions, from small Earth and science programs/projects like the Earth System Science Pathfinders, Explorers and Solar Terrestrial Probes, to large Earth and space science programs/projects such as Earth Observing System spacecraft, the Hubble Space Telescope, Geostationary Operational Environmental Satellites and Polar Operational Environmental Satellites. The directorate manages the implementation, maintenance and operations of end-to-end space operations architectures, including mission operations and tracking and data acquisition services for missions supported by GSFC. It is also responsible for the development of the Tracking and Data Relay Satellites and International Projects assigned by NASA Headquarters.

Applied Engineering and Technology – This directorate provides agency-wide management of areas of technology development for near Earth orbiting missions; provides agency-wide management of the Small Business Innovation Research program and the Small Business Technology program; and provides oversight management and administrative support for the NASA Institute for Advanced Concepts.

Systems, Technology, and Advanced Concepts – This directorate enables science discovery by providing end-to-end systems engineering expertise and leadership for the development of science mission systems and instruments, advanced concepts and technology. The directorate also facilitates the transfer and commercialization of technology.

Space Sciences – The Space Science Directorate enables major elements of the national space science program associated with the study of the solar system, the galaxy and the universe through the conduct of theoretical studies, data analysis, experiments and the development of projects and technologies for space borne instrumentation.

Suborbital Projects and Operations – This directorate is responsible for the overall management, operation and support of NASA's sounding rocket and balloon programs, university class Explorer satellites and small payloads that fly on the Space Shuttle. This function is located at the Wallops Flight Facility, Wallops Island, Va.

Earth Sciences – The Earth Science Directorate conducts scientific studies in the Earth sciences leading to a better understanding of processes affecting global change and the distribution of natural resources through research, development and application of space technologies.

Workforce

Approximately 11,740 persons work at the Goddard Space Flight Center at all of its sites. This number includes 3,186 civil servants and 7,590 contractor personnel at the Greenbelt, Md. campus; 243 civil servants and 673 contractor personnel at the

Wallops Flight Facility, Wallops Island, Va.; and 18 civil servants and 33 contractor personnel at the Goddard Institute for Space Studies in New York, NY. Of this number, 2,946 civil servants and 6,858 contract personnel reside in the State of Maryland.

Total Greenbelt Workforce January 1999

	Civil Servants	Contractor Personnel
Clerical Professional/	247	303
Administrative Scientist/	769	1,537
Engineer	1,866	4,387
Technician	241	857
Wage Grade	63	506
Total Workforce	**3,186**	**7,590**

Source: NPPS & Locator and Information Services Tracking Systems (LISTS)

Facilities

Goddard has personnel and facilities capable of creating, building, testing, launching and operating various satellite projects in support of Earth Science, space science and advanced technology programs.

Goddard's Greenbelt campus in Greenbelt, Md., encompasses 33 major buildings and over 50 minor buildings and structures providing nearly 3,800,000 square feet of space. Goddard's most recent additions to its physical plant, the Earth Observing System Data and Information System facility built in 1995, and the Earth Systems Science Building built in 1998, were constructed to house the scientists, laboratories and information systems required for Goddard as NASA's lead center for Earth Sciences.

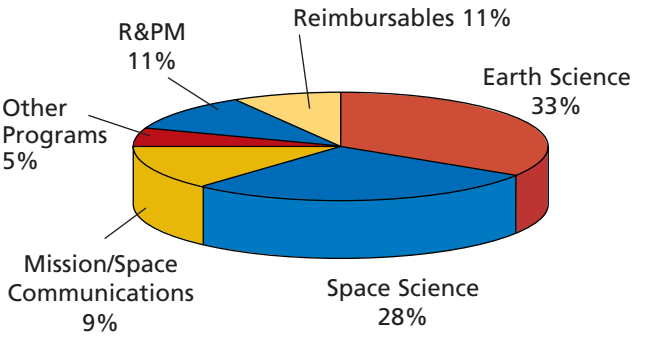
The EOSDIS accommodates personnel working three shifts, 24 hours a day, 365 days a year. EOSDIS provides 190,000 gross square feet (17,651 square meters) of office, data-processing and data-archiving space. This facility serves as a key data-retrieval node in the Earth Observing System communications system, as well as a distribution center for Earth data from numerous spacecraft and instrument sources, such as the Total Ozone Mapping Spectrometer and Tropical Rainfall Measuring Mission. The facility houses systems necessary for overall management of the Earth Observing System ground system and the largest of eight nationwide Distributed Active Archive Centers, necessary for archiving a significant portion of the Earth Observing System observational data. It also governs the mission operations and instrument control-center functions needed to monitor and control the Earth Observing System space platforms and the suites of instruments while in Earth orbit.

The Earth Systems Science Building houses most of the Center's Earth scientists—some 750 civil servant and contractor personnel. The building provides approximately 237,000 gross square feet (22,000 square meters) of office and lab space, housing the Laboratories of Goddard's Earth Sciences Directorate: the Laboratory for Atmospheres, Laboratory for Terrestrial Physics and Laboratory for Hydrospheric Processes.

For a more detailed view of GSFC's facilities and services, visit the Facilities Management Division Homepage at http://gsfc-aphrodite.gsfc.nasa.gov/220/home.htm.

Budget

As illustrated in the pie chart below, Goddard's budget for Fiscal Year 1999 is approximately $3,079.4 billion.



	FY98
Earth Science	2,477.0
Space Science	2,483.5
Mission/Space Communications	2,424.1
Other Direct Programs	567.8
Indirects	1,858.2
Total	**9,810.6**

Goddard: A Unique National Resource

Goddard Space Flight Center is NASA's Center of Excellence for scientific research, giving Goddard a focused agency-wide leadership responsibility in this area. Goddard is charged with being preeminent within the Agency with respect to the human resources, facilities and other critical capabilities associated with scientific research.

Goddard's Role in Space Science

To support NASA's Space Science Enterprise, Goddard leads the mission of space-based physics and astronomy to create opportunities for conducting research through a broad variety of flight opportuni-

ties. Goddard promotes the development of advanced technology designed to enhance scientific capabilities at an affordable cost. Goddard seeks answers about how the universe formed, what it is made of, how its components interact and how it evolves. The center also contributes to the quest to learn how stars and planetary systems form and evolve. Goddard missions seek to determine the nature of the Sun's interaction with its surroundings and discover the properties of interplanetary space as well as the plasma environment of the planets.

Goddard's Role in Earth Science

To support NASA's Earth Science Enterprise, Goddard leads the mission of Earth System Science and plays a major role in this new interdisciplinary field. The Earth Observing System is the centerpiece of NASA's Earth Science Enterprise. It consists of a science component and a data system component supporting a coordinated series of polar-orbiting and low inclination satellites for long-term global observations of the land surface, biosphere, solid Earth, atmosphere and oceans. Research in this area will advance understanding of the Earth as an environmental system by determining how its components have developed, how they function, how they interact with one another and how they evolve on various time scales. This will enable scientists to quantify the practical impacts that both natural and human activities will have on the Earth's resources during the next decade and over the next century.

Goddard's Role in Technology

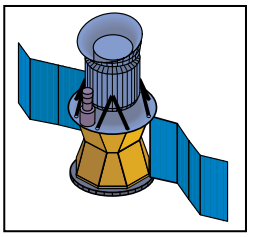
Goddard is committed to the development and infusion of cutting-edge technology to increase mission performance and capabilities while reducing the costs of performing scientific measurements from space. To accomplish this, Goddard provides agency leadership to advance next generation spacecraft, sensor and instrument technology. Goddard scientists and engineers have gained significant expertise in areas such as optics development, cryogenics, microelectronics, X-ray astronomy, Earth observation and information systems.

Many successful U.S. products and innovations have been derived from Goddard research and technology. These innovations improve and enrich American's daily lives. For example, the same technology that enables the Hubble Space Telescope to see distant stars and galaxies is now used to detect the earliest signs of breast cancer. In addition, Goddard's detector technology has enabled overall improvements in X-ray procedures. Other medical advancements derived from GSFC technology include the Implantable Cardioverter Defibrillator, the Programmable Implantable Medication System and Pacemaker Systems.

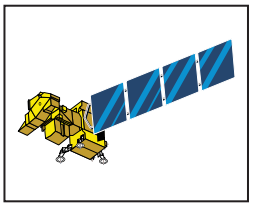
Other recent examples of Goddard technology success stories include: developments in guidance and navigation systems; advancements in weather forecasting systems; advancements in environmental topographical mapping; and improvement of information systems technology.

1999 Goddard Programs and Launches

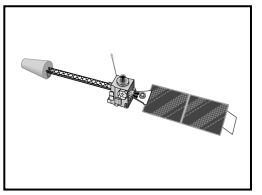
Goddard Spacecraft, Instruments and Launches for 1999.



WIRE – The Wide-Field Infrared Explorer was launched from Vandenberg Air Force Base, Calif., on May 4, 1999. Shortly after launch, spacecraft controllers believe the primary telescope cover was released about three days earlier than planned. As a result, a container of frozen hydrogen designed to cool the instrument warmed up and vented into space causing the spacecraft to spin. Loss of the entire supply of frozen hydrogen ended the scientific mission of the spacecraft. Engineers will use the spacecraft as an engineering testbed to evaluate advanced attitude control systems, communications and data handling and operations.



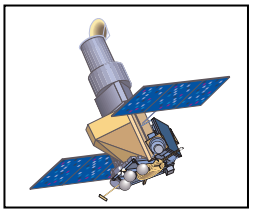
LANDSAT 7 – Landsat 7 was launched April 15, 1999 on a Delta II rocket from Vandenberg Air Force Base, Calif. The Landsat-7 spacecraft will provide images of the Earth's continental surface, a continuation of the more than 25-year record of images provided by previous Landsat satellites.



GOES-L - Geostationary Operational Environmental Satellite is scheduled to launch in May 1999. The GOES system is a basic element of U.S. weather monitoring and forecast operations and is a key element component of NOAA's National Weather Service operations and modernization program.

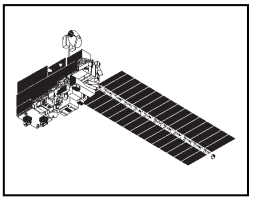
TERRIERS - A Tomographic Experiment using Radiative Recombinative Ionospheric EUV and Radio Sources mission is a scientific research project involving a unique combination of satellite and ground-based instrumentation. TERRIERS's primary goal is to conduct a global upper-atmospheric study using a combination of ground-based and space instruments. TERRIERS is scheduled for launch in May 1999.

QuikSCAT - The QuikScatterometer satellite is a specialized microwave radar that will measure near-surface wind speed and direction under all weather and cloud conditions over Earth's oceans. QuikSCAT is scheduled for launch in May 1999.



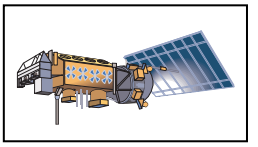
FUSE – The Far Ultraviolet Spectroscopic Explorer will investigate the origin and evolution of the lightest elements in the Universe - hydrogen and deuterium - created shortly after the Big Bang, and the forces and processes involved in the evolution of the galaxies, stars and planetary systems. FUSE is scheduled for launch in June 1999.

TDRS-H - NASA's Tracking and Data Relay Satellite-H is the next in a series of communications satellites that serve as the sole means of continuous, high-data-rate communications with the Space Shuttle, the International Space Station and with dozens of unmanned scientific satellites in low-Earth orbit. TDRS-H is the first of three satellites that will replenish NASA's aging TDRS satellite network. TDRS-H is scheduled for launch in July 1999.



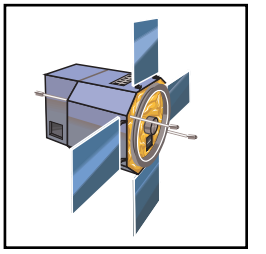
TERRA - Formerly called Earth Observing System AM-1, Terra will observe changes in the Earth's radiation energy budget, together with measurements of changes in land/ocean surface and interactions with the atmosphere through exchanges of energy, carbon and water. Terra is scheduled for launch in July 1999.

ACRIMSAT - The Activity Cavity Radiometer Irradiance Monitor spacecraft will measure Total Solar Irradiance during its five-year mission life as part of the U.S. Global Climate Research Program. The ACRIMSAT spacecraft is the third in a series of long-term solar-monitoring tools. It is scheduled for launch in October 1999.



POES (NOAA-L) - The Polar-Orbiting Operational Environmental Satellite Program (NOAA-L) spacecraft will monitor the entire Earth, providing atmospheric measurements of temperature, humidity, ozone and cloud images as they track weather patterns that affect the global weather and climate. NOAA-L is scheduled for launch in December 1999.

EARTH OBSERVING 1 - The first of three New Millennium Program Earth orbiting missions is Earth Observing 1, an advanced land imaging mission that will demonstrate new instruments and spacecraft systems. EO 1 will validate technologies contributing to the reduction in cost of follow-on Landsat missions. The centerpiece of this mission is the Advanced Land Imager instrument, which is one seventh the mass, power consumption and volume of the Landsat 7 imager, the Enhanced Thematic Mapper plus. The new instrument will demonstrate remote-sensing measurements of the Earth consistent with data collected since 1972 through the Landsat series of satellites, which is used by farmers, foresters, geologists, economists, city planners and others for resource monitoring and assessment. EO 1 is scheduled for launch in December 1999.



SAC-C - The Satelite de Aplicaciones Cientificas-C is an international cooperative satellite mission between NASA and Argentina. SAC-C will provide studies of the structure and dynamics of the Earth's atmosphere and ionosphere and geomagnetic field. NASA is providing launch and scientific instrumentation and is responsible for overall project management. SAC-C is scheduled for launch in December 1999.

SAGE – The Stratospheric Aerosol and Gas Experiment is the fourth generation satellite-borne instrument and a crucial element in NASA's Earth Observing System. Its mission is to enhance our understanding of natural and human derived atmospheric processes. SAGE III's role in the Earth Observing System program is to provide global, long-term measurements of key components of the Earth's atmosphere. SAGE is scheduled for launch in 1999.

Major Contractors at Goddard, Greenbelt, Maryland

McDonnell Douglas Corporation
AlliedSignal Technical Services
Lockheed Martin Corp.
TRW, Inc.
Hughes Aircraft Company
Hughes Information Technical Corporation
Ball Aerospace & Tech. Corporation
ITT Corporation
Hughes STX Corporation
Swales & Associates, Inc.
Santa Barbara Research Corporation
Space Systems Loral, Inc.
Jackson & Tull, Inc.
Aerojet General Corporation
Orbital Sciences Corporation
NSI Technology Services Corporation
Cortez III Service Corporation
Computer Sciences Corporation
Fairchild Space & Defense Corp.
Raytheon Service Company
Science Systems Application
Unisys Corporation
General Sciences Corporation
Brown & Root Services Corporation
QSS Group, Inc.